Principles of Economics I 2020
Aalto University School of Business
Juuso Välimäki

Problem Set 2 (Due 25.9.2020 at 10:00)

1. Let's practice a bit more with indifference curves and budget sets. Draw the indifference curves for a consumer with the following types of preferences over oranges and apples.

   (a) A consumer that considers apples and oranges to be interchangeable, i.e. an apple is equally good as an orange to her.

   (b) A consumer that is allergic to apples but likes oranges (assume that the consumer can discard any apples that she has if she wants).

   (c) A consumer that hates oranges and likes apples (assume that the consumer can discard any oranges that she has if she wants).

   (d) A consumer that likes to eat fruit but only in a fruit salad where she puts exactly the same amount of apples and oranges.

   (e) Draw the budget set for a consumer that spends her budget I on apples and oranges. Put apples x on the x-axis and oranges y on the y-axis in a plane. Let p_x denote the price of apples and p_y the price of oranges so that the cost of consuming x, y is $p_x x + p_y y$. Draw the budget set for $I = 200, p_x = 4, p_y = 2$ draw also the budget set for $I = 100, p_x = 2, p_y = 1$. What do you observe and how do you explain this?

   (f) (Extra credit) As in the previous part, let x be the consumption of apples and y the consumption of oranges. Consider the consumer whose MRS between apples and oranges depends on the ratio of her consumption so that MRS $= \frac{y}{x}$. This means simply that for example at $x = 30, y = 60$ she considers each apple to be equally desirable as two oranges. From the two equations $MRS = MRT$ and the budget constraint $p_x x + p_y y = I$, solve the optimal consumption x^*, y^* of apples and oranges. (Hint: treat p_x, p_y, I as parameters in the problem, i.e. treat them as you would treat fixed numerical values).

2. At current wages of EUR 10 per hour Ann chooses to work for 8h per day. To reward her for good performance, her boss gives her a raise to EUR 15 per hour. Ann is lucky enough to be in a job where she can pick her own working hours.

   (a) Can you say with certainty what will happen to Ann's working hours as a result of this raise?

   (b) Ann computes that at her old working hours, the boss ends up paying EUR 40 more per day. She is tempted to go to the boss and ask for a different wage contract. A flat payment of EUR 40 per day and the old wage of EUR 10 on top. Draw the budget constraint for the alternative wage contract and for the EUR 15 per hour wage (without flat payments).

   (c) What is your advice to Ann: should she ask for this alternative contract?

   (d) Suppose that the boss wants to induce Ann to work more. Rather than raising the wage, the boss gives a bonus EUR 10 per hour for each extra hour of overtime work (i.e. if Ann works for $t > 8$ hours, then her pay is $EUR80 + (t-8)20$, for $t \leq 8$, the pay is unchanged). Draw Ann's budget set in this case.

   (e) Continuing on the previous problem, draw Ann's indifference curves in such a way that is consistent with the choice of $t = 8$ in the original budget set and with $t = 10$ in the new budget set. What is Ann's average pay per hour in the new wage scheme at her optimally chosen working hours? How would Ann choose her working hours if she got paid this average wage for each of the hours that she works and no overtime bonus?

3. Consider next a simple game theoretic situation. There is a crossroads of two one-way roads. One of the roads runs from south to north while the other runs from west to east. Two drivers come to the crossroads simultaneously from different directions. Ann comes from the south while Bob arrives from the west. Ann and Bob must decide simultaneously whether to continue driving or wait.

   (a) Who are the players, what are the strategies, what are the outcomes and what are reasonable payoffs? In other words, draw a game matrix representing this situation.

(b) Does either of the drivers have a dominant strategy? Are there Nash equilibria?

(c) If there are many equilibria, how should the players know which one to play? Consider various traffic rules and arrangements to help in choosing a Nash equilibrium. Why do we see different practical solutions to the problem?

4. Tax collection is complicated by the existence of tax fraud. Fraud can be detected by experienced tax officer but unfortunately it is costly to hire those officers. Consider then the following model of tax fraud. There are two players: (tax) officer and (tax) payer. The officer decides whether to monitor the filings of the tax payer at a cost or not monitor. The tax payer files either honestly or fraudulently. Honest filings are always accepted but fraudulent filings are caught if the officer chooses to monitor. With an undetected fraudulent filing, the tax payer pays little taxes. With an honest filing, she pays a moderate amount. If she files fraudulently and is caught, then she pays a very large fine on top of honest taxes. The tax officer pays nothin and receives no payments if she does not monitor. She pays the cost of monitoring if she monitors and from the fraudulent taxes she also collects the fine.

   (a) Draw a game matrix for this situation. Assume first that the payoffs are simply the monetary payoffs to the players.

   (b) Does this game have dominant strategies? What about Nash equilibria?

   (c) (Extra credit) How does the game change if you allow for the possibility that tax payers may feel guilty about committing tax fraud?

5. Two friends meet for dinner at a restaurant that serves 4 different menus. The prices of the menus are EUR 30, EUR 40, EUR 50, EUR 60. Both friends value the menus (in the same order) at EUR 33, EUR 44, EUR 52, EUR 59. This means that the menu priced at EUR 50 is worth EUR 52 to the diner and therefore a relatively good deal.

(a) When dining, you choose a single menu from the list. How would each of the two friend choose if they were eating alone in the restaurant?

(b) Suppose now that the friends choose simultaneously their menus and they have agreed to split the bill, i.e. each pays half of the sum of the menus that were chosen. In this case, the material payoff to each friend is the value of the meal minus the cost, i.e. half of the sum of the prices of the two menus. Draw the game matrix for this case.

(c) Do the players have dominant strategies? If yes, is the dominant strategy equilibrium socially desirable? If no, what kinds of Nash equilibria does the game have?

(d) Do you think that in this type of a situation, there should be other concerns to include in the subjective payoffs?